Data Structures

Basic Types

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Basic Types

- Array

- List

- Set

- Map

Basic Types

- Array: Fixed-size sequence of elements

- List: Sequence of elements

- Set: Unique collection of elements

- Map: Unique keys paired to values

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Basic Properties

- All sequences have an index/position/offset

- All are of finite; have a size/length property

- All store elements of the same type*

- All abstract data types; speed of operations dependent on specific implementation

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Arrays

- Stores a sequence of elements
  – Each element has an associated index

- Allows duplicate elements of same type

- Size may NOT change after initialization

- Often implies sequential memory allocation

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Lists

- Stores a sequence of elements
  – Each element has an associated index

- Allows duplicate elements of same type

- Size MAY grow or shrink after initialization

- More flexible but slightly slower than arrays

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Sets

- Stores a collection of elements
  – No indices, but still has a size

- Stores unique elements of same type

- Size MAY grow or shrink after initialization

- Usually faster at searching than lists

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Maps

- Stores a collection of key, value pairs
  - No indices, but still has a size

- Stores unique key elements

- Allows duplicate value elements

- Size MAY grow or shrink after initialization

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Summary

Type	Index	Size	Unique	Other
Array	Yes	Fixed	No	Lower-level type
List	Yes	Flexible	No	Searching is slow
Set	No	Flexible	Yes	Searching is fast
Map	No	Flexible	Keys	Maps key, value pairs